Boston EMS 2019 Cyclist & Pedestrian Report

INTRODUCTION & METHODS

In 2013 Boston EMS implemented a new record evaluation tool to identify and track patient encounters involving pedestrians and cyclists. The city's Computerized Aided Dispatch (CAD) provides geographical information which allows for seamless tracking of incidents throughout the city. The CAD system also includes codes to classify the type of patient encounter, however, this system has not always been accurate. This requires manual review of incident reports to ensure accuracy. In recent years grant funding from the National Highway Traffic Safety Administration, through the Massachusetts Office of Grants and Research, has enabled:

- Efficient and accurate incident tracking
- Ability to track incident locations overtime
- Tracking incident cause, helmet use, and bicyclist activity during time of the incident
- Transparency and accessibility of results for Boston residents and stakeholders

DATA COLLECTION

Boston EMS and the City of Boston are dedicated to providing excellent patient care through monitoring and applying its traffic safety data to reduce further incidents from taking place. All information collected by EMS including clinical impressions, signs and symptoms, general descriptions of what occurred, and patient activity prior to the incident support our objective.

Boston EMS' electronic Patient Care Reporting system (ePCR) provides for comprehensive data capture and real-time reporting. Each ambulance is equipped with a tablet that allows for collection of patient care information which is then transmitted to a secure central database. All Boston EMS personnel understand the importance of documenting patient encounters accurately and efficiently.

VALIDATION

A Boston EMS Data Analyst created reporting functions that search all available records for relevant keywords to identify potential bicyclist and pedestrian patient encounters. These search words include: bike, bicyclist, helmet, pedestrian, standing, ambulatory, and standing.

A Boston EMS staff member then reviews these records and confirms each identified encounter fits the criteria to be included in either the bicyclist or pedestrian crash database. For bicyclist encounters the case definition is limited to non-motorized outdoor bicycles, where the precipitating incident is directly attributable to the act of recently riding a bike. Patient encounters involving motorcycles, spin-exercise equipment, bicycle maintenance, or motorized scooters are excluded, as are medical illnesses such as syncope and cardiac arrest that occur simultaneously while a patient is riding a bike. Verified data is then stored separately for data analysis and reporting.

VISION ZERO

Boston EMS is a collaborative in the City of Boston's Vision Zero taskforce dedicated to eliminating fatal and serious traffic incidents by 2030. Roadway incident data with a confirmed

Boston EMS response are reported on the Vision Zero website and are used to inform the Department of Transportation's roadway improvements. When reviewing Vision Zero's statistics it is important to keep in mind that Boston EMS also responds to state roadways and highways which are not included in the City's report. Furthermore, Vision Zero's figures are reported by incident while Boston EMS' figures are by patient transport. Additionally, Boston EMS may care for multiple patients at one incident, although this is not common.

CAVEATS

It is important to note that Boston EMS personnel are not responsible for determining fault in bicyclist or pedestrian crashes. While the ePCR does document apparent causes for incidents precipitating the patient encounter, the Boston Police Department (BPD) is responsible for investigating and determining fault. Boston EMS discourages readers from drawing inferences from data provided in this report. For example, the helmet use data suggests males are less likely to use helmets than female bicyclists, however, it is difficult to determine if this is due to gender or if more males were involved in incidents than females in 2019.

2019 FINDINGS

PATIENT COUNTS

The final Boston EMS data for 2019 shows a reversal in the data patterns observed in the previous year. In 2018, there was an increase in the number of bicyclist crashes from 2017 to 2018 while there was a decrease in the number of pedestrian incidents from 2017 to 2018. The 2019 data reveals a flip in the data where the pedestrian encounters increased from 2018 to 2019 while the bicyclist incidents fell.

BICYCLIST INCIDENTS

There were over 377 bicyclist incidents recorded in 2019, with 271 incidents required transport to a medical facility. Of the remaining 106 incidents, 8 were categorized as "no medical", 96 cases as a patient refusal, and 2 were transferred to other EMS providers. Of the transports, 9 required Advanced Life Support (ALS), indicating a higher severity of injury and level of care. Of the remaining transports 262 were transported by Basic Life Support (BLS), indicating a lower severity of injury.
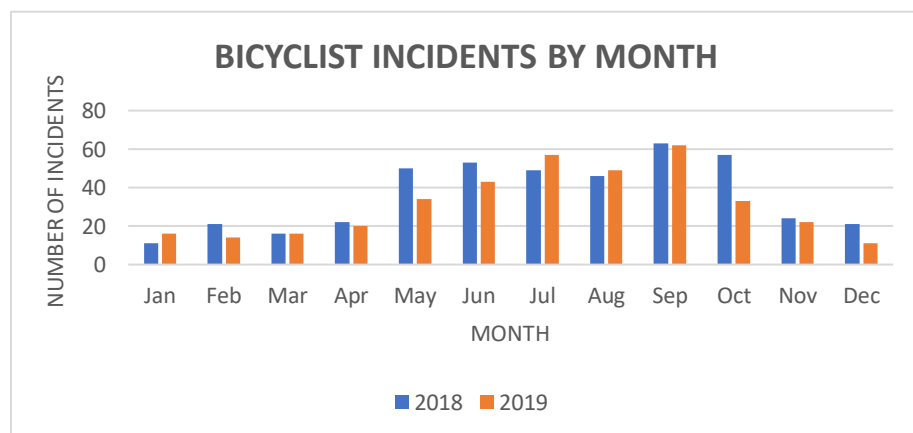

Figure 1: Depicts total bicyclist incidents during the 2019 year by month as compared to 2018.
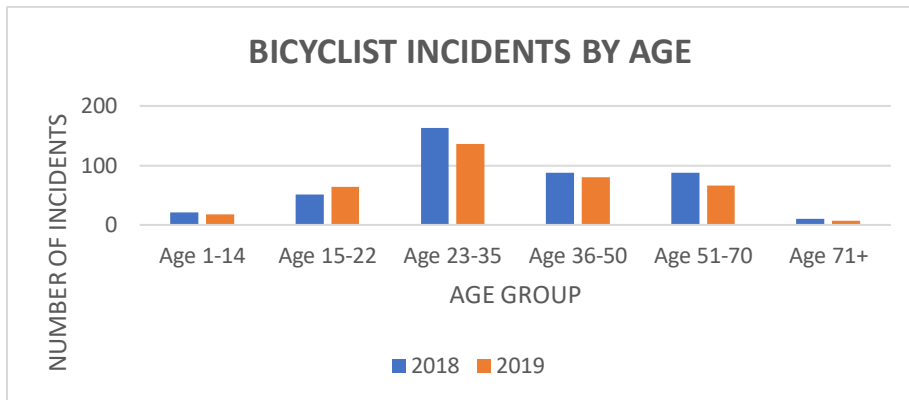
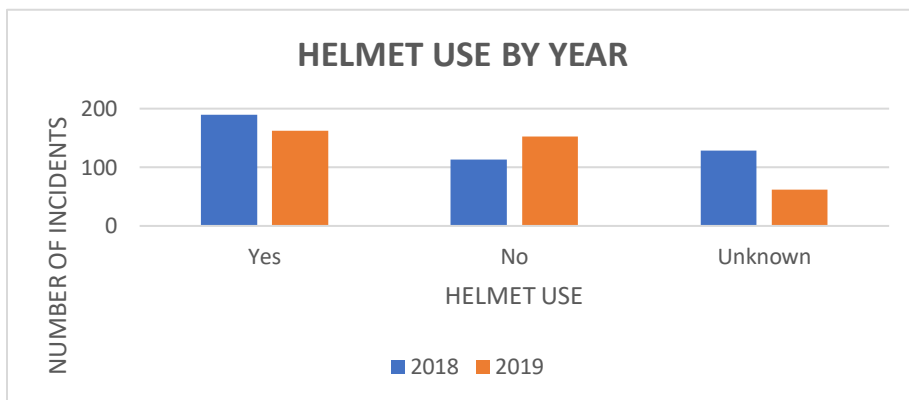**Figure 2:** Bicyclist incidents by age. Approximately % of all incidents occur in the 21-40 age group.

Figure 3: Helmet use decreased in 2019, where 26% of bicyclists did not wear helmets in 2018, but in 2019 it was 41%.
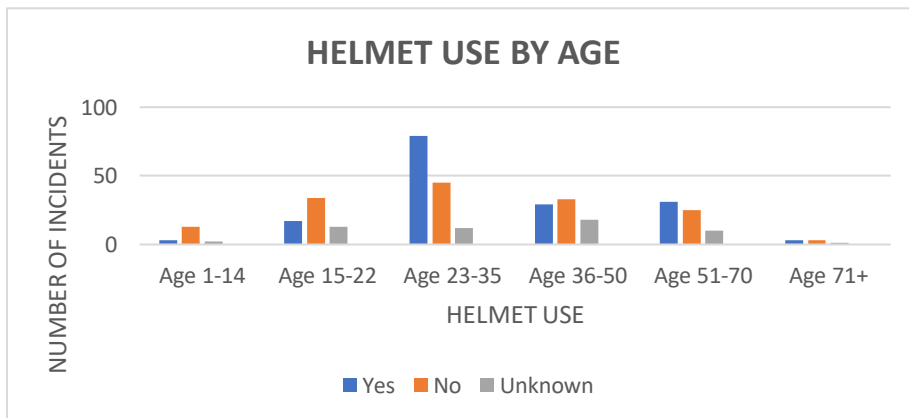

Figure 4: Breakdown of helmet use by age group in 2019. Shows residents under 22 years of age are noncompliant with helmet use less likely to wear helmets compared to older groups.
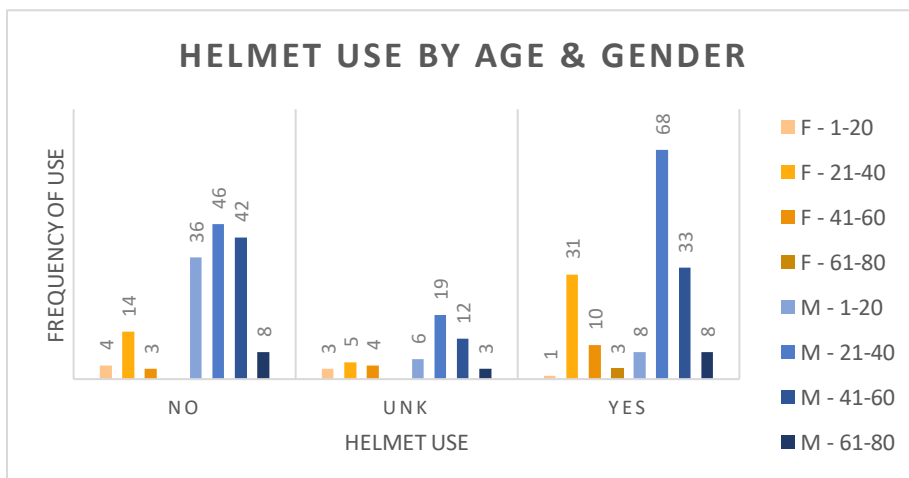

Figure 5: Helmet use by age group and gender for bicyclist incidents during the 2019 year. Reveals males are less likely than females to wear helmets.

Level of Care	Transports
Basic Life Support (BLS)	262
Advanced Life Support (ALS)	9
TOTAL	371

Table 1: Shows level of service for all bicyclist incidents. Data shows 3% of all bicyclist incidents result in injuries that receive a higher level of service, while 97% of incidents are treated by BLS.

Incident Outcome	Incidents
Refusal	96
Transport	271
TOTAL	367

Table 2: Breakdown of bicyclist incident outcomes. Data collection shows 78% of patients involved in bicyclist crashes are male, however, this is unsurprising given that there are more male than female bicyclists in Boston. When examined by gender there was only a nominal difference between men and women where 24.3% of women refused transport and 26% of men refused transport.
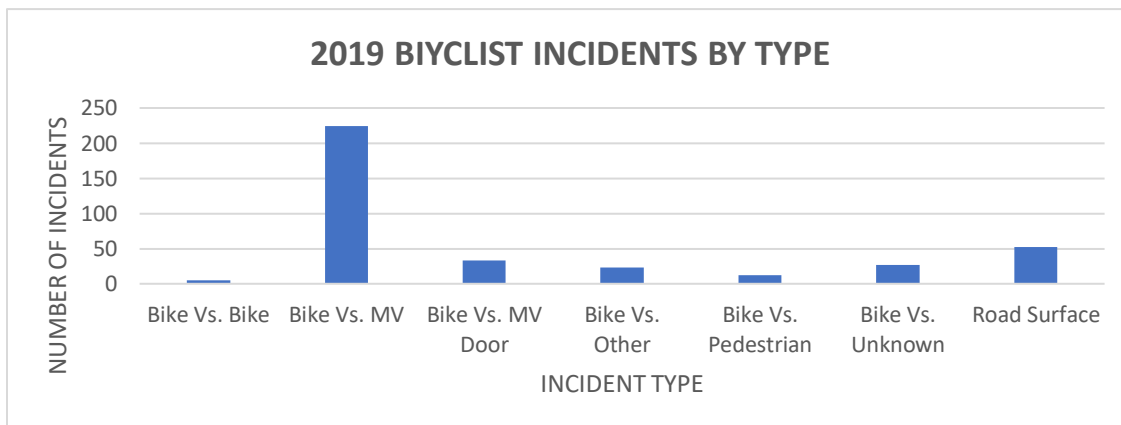
INCIDENT TYPES

Figure 6: Depicts incident causes during the 2019 year by type. Reveals a trend of increased bicyclist crashes during the summer months. There were nominal trends by month, revealing incident types to remain consistent throughout the year except for Road Surface and MV Door incidents. These two incident types are further broken down in Figures 7 & 8.
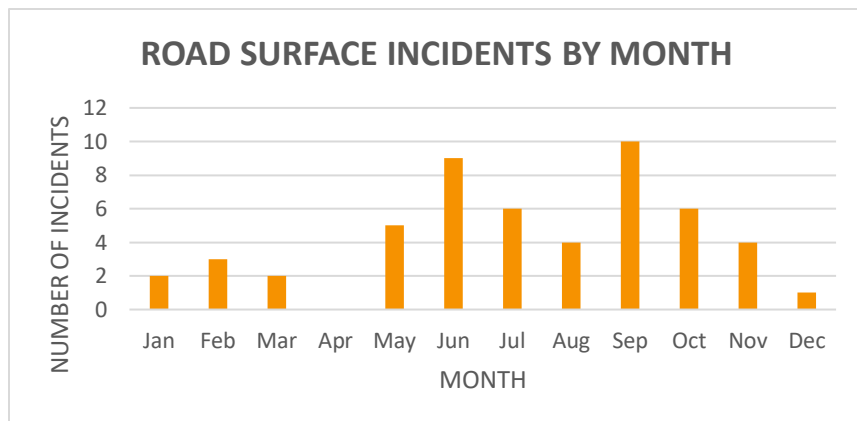
ROAD SURFACE INCIDENTS BY MONTH

NUMBER OF INCIDENTS

MONTH

Figure 7: Breakdown of Road Surface incidents by month in 2019. Reveals a spike in incidents in September.

MV DOOR INCIDENTS BY MONTH
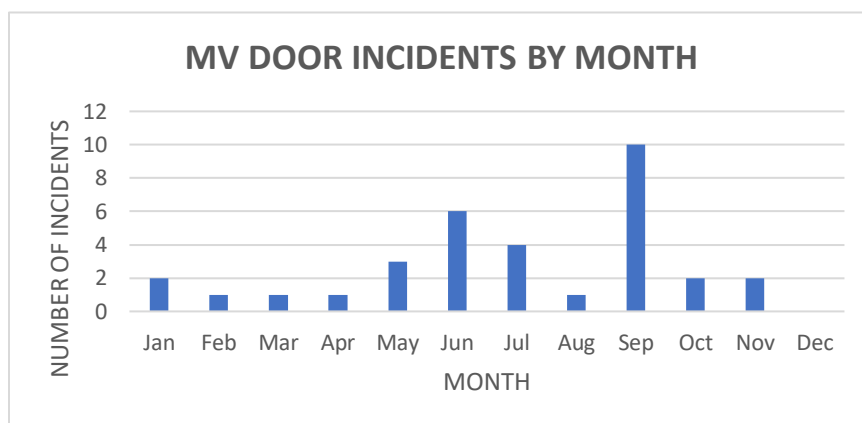
NUMBER OF INCIDENTS

MONTH

Figure 8: Breakdown of MV Door incidents by month in 2019. Reveals a similar trend to Road Surface data, revealing a spike in incidents in the month of September.

There were 33 bicyclist incidents involving a motor vehicle (MV) door or side mirror, where a bicyclist would be traveling in the bicyclist lane and would be knocked from their bike when an individual opened their car door. There were 222 documented bicyclist vs. MV incidents in 2019. This is consistent with previous years. July had the highest incidence of crashes, with a high of 39 reported incidents.

Although the summer months tend to have higher rates of bicyclist incidents compared to the other months, June through August encompasses approximately 41% of all bicyclist vs. MV incidents in the year. This is partially attributed to changes in weather and time patterns where individuals are spending more time outside than in other months.

There was a total of 5 bicyclist vs. bicyclist incidents reported in 2019. In 2019, over 12 bicyclist incidents involved a pedestrian. There were 52 incidents involving a road surface resulting in a bicyclist crash in 2019. Road surface refers to uneven pavement, trolley grooves, slippery roads, or other roadway barriers. There were 27 bicyclist incidents involving an unknown cause for a bicyclist to get into a crash in 2019. An incident is classified as unknown when there is no recording in the case file specifying the incident cause.

Of all incident types, bicyclist v. motor vehicles had the greatest number of transports, representing 53.8% of all transports. The second most frequent incident to be transported resulted from road surfaces, accounting for 16.6% of all ambulance transports.

Helmet use was analyzed by age group and gender. Data shows residents under the age of 22 are less likely to wear helmets compared to older generations. This could be prevented with an intervention strategy focusing on school systems to educate their students on the importance of safety and helmet use. It is also suggested schools that loan out bicycles also provide a helmet with use of the bike to curb the number of bicyclist incidents from taking place.
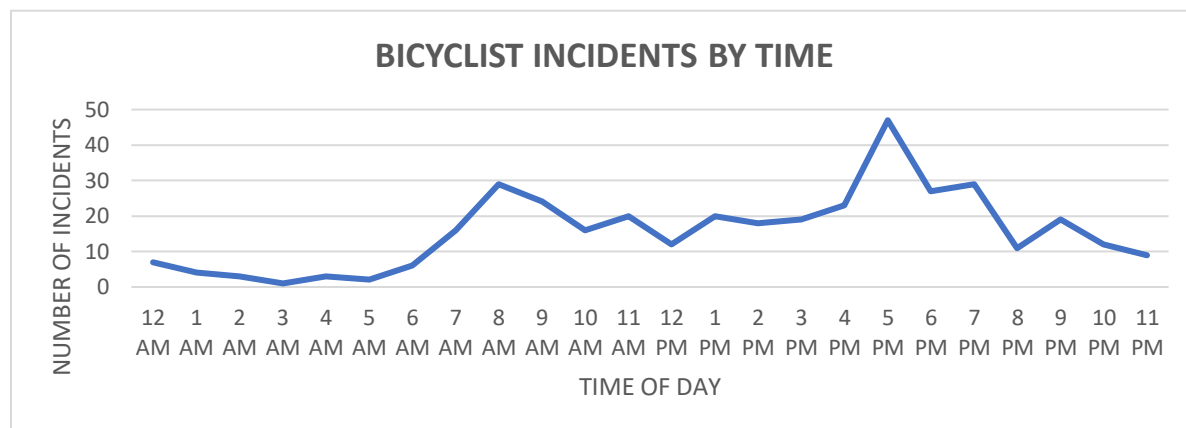
TIME AND WEATHER IMPACT

Figure 9: Graph of bicyclist incidents by time of day during 2019. Data is consistent with previous years showing peaks of crashes during "rush hour" times.
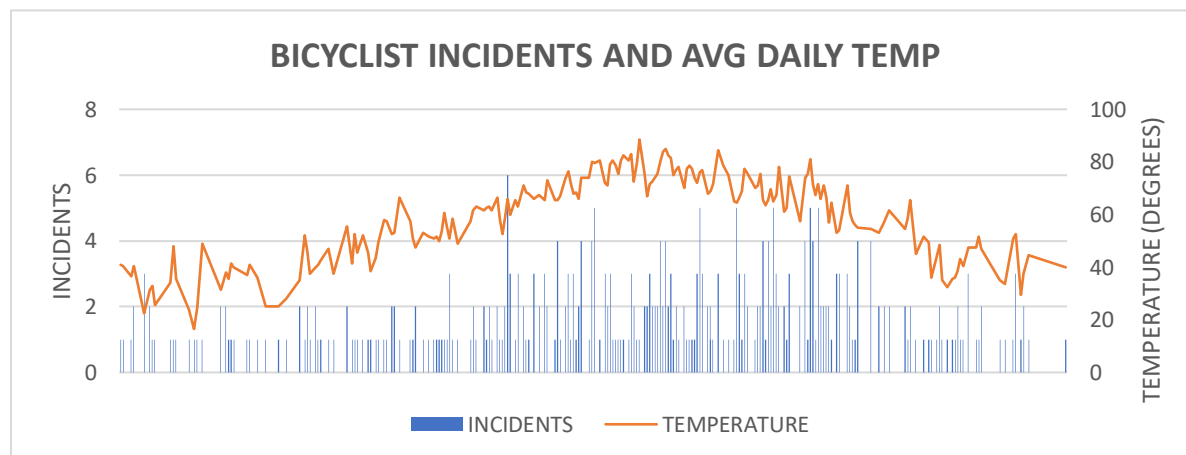

Figure 10: Depicts bicyclist incidents and the average daily temperature throughout 2019. Shows positive correlation between temperature and the number of bicyclist incidents. Data suggests the warmer the temperature the more bicyclists out on the road that result in more incidents.
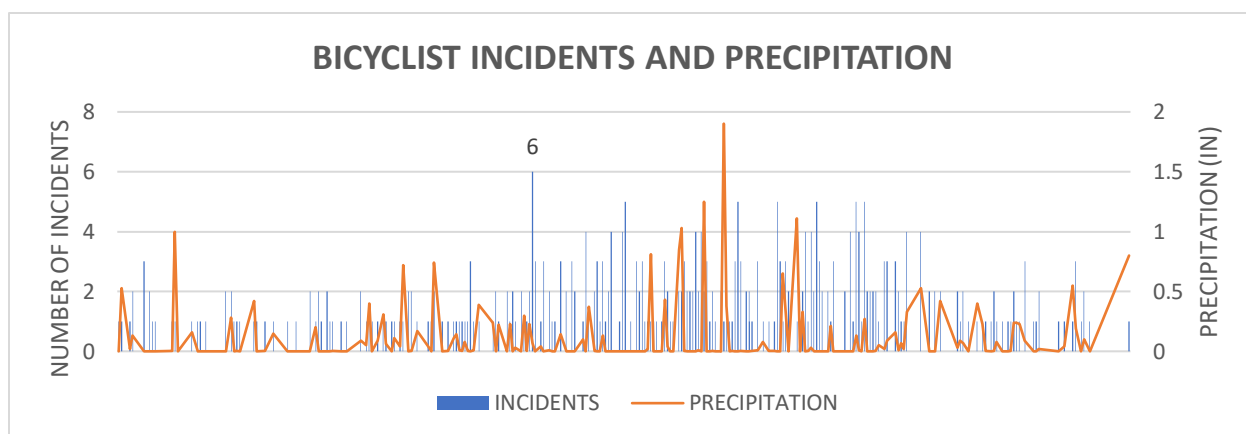
Figure 11: Graph tracks trends between bicyclist incidents between and precipitation during 2019. Shows where there is an increased level of precipitation there is a corresponding number of incidents. Except for 5/31 which had a spike of bicyclist v. MVAs.

BICYCLIST INCIDENTS BY NEIGHBORHOOD

Incident Type	Highest Cases	Second Highest Cases	Third Highest Cases
MV Door	Boston (5.3%)	Roxbury (1.6%)	Brighton (0.8%)
MV	Boston (15.4%)	Dorchester (12%)	Roxbury (10.6%)
Bike	Boston (0.5%)	Dorchester (0.5%)	Mattapan (0.3%)
Pedestrian	Boston (1.9%)	Brighton (0.5%)	Roxbury (0.3%)
Road Surface	Boston (3.7%)	Roxbury (2.1%)	Charlestown (1.6%)
Unknown	Boston (2%)	Dorchester (1%)	Jamaica Plain (1%)
Other	Boston (2.1%)	Dorchester (1%)	Brighton (0.8%)

Table 3: Depicts bicyclist incidents by neighborhood and incident type. Calculated percentages represent the percentage of the total incidents for that particular incident type. Boston proper accounts for 15.4% of all bicyclist incidents involving a MV, Dorchester accounts for 12%, and Roxbury 10.6%. Bicyclist incidents caused by Road Surface abnormalities is highest in Boston proper (3.7% of all bicyclist incidents) followed by Roxbury (2.1%) and Charlestown (1.6%).

The data suggests Boston proper, Dorchester, and Roxbury represent the most dangerous areas of Boston. However, these areas do have higher population densities and heavier congestion due to public transport. Boston proper encompasses Central, Beacon Hill, Back Bay, Fenway/Kenmore, and Downtown. Dorchester accounts for approximately 19% of the total Boston population, and 12% of all bicyclist v. motor vehicle incidents.

PEDESTRIAN INCIDENTS

There were over 736 pedestrian incidents in 2019, a representing a 6.5% increase in cases since 2018. Over 587 patients were transported to medical facilities, 129 refusals, 6 "no medicals", and 4 fatalities. Of the transports, 61 patients were transported by ALS units, while 526 were transported by BLS units.
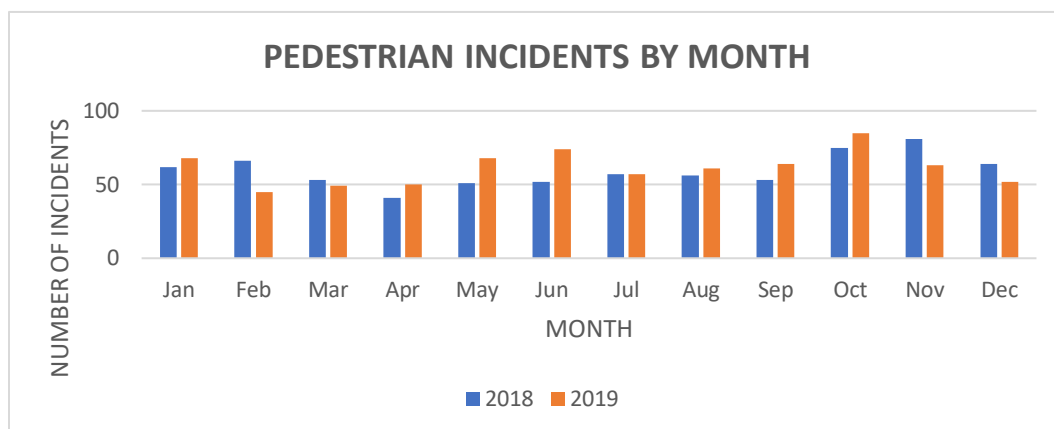
Figure 12: Compares pedestrian incidents by month during 2018 and 2019. Data shows 6.5% increase in pedestrian cases since 2018.
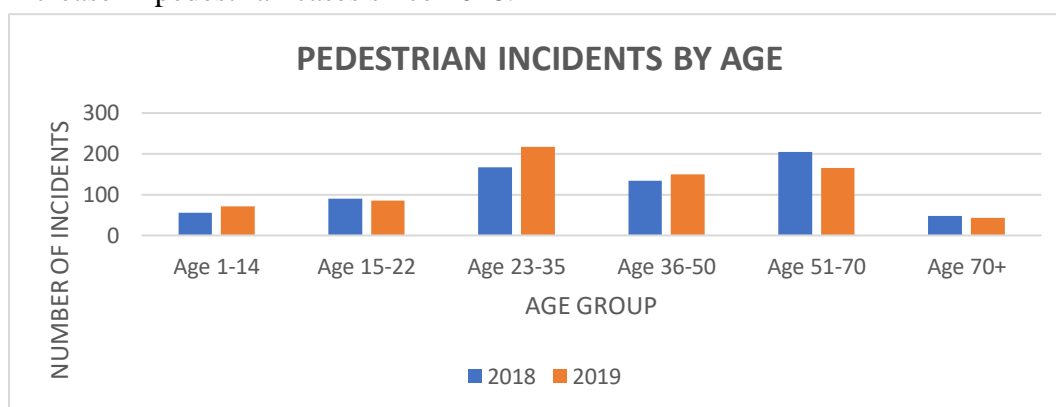

Figure 13: Breaks down pedestrian incident by age group from 2018-2019. Shows upward trend in 2019, with the greatest incidence among the young adult group (23-35-years-old).

Level of Care	Transports
Basic Life Support (BLS)	526
Advanced Life Support (ALS)	61
TOTAL	587

Table 4: Shows level of service for all pedestrian incidents. Data shows 8.3% of all pedestrian incidents result in injuries that receive a higher level of service, while 91.6% of incidents are treated by BLS.

Incident Outcome	Incidents
Refusal	129
Transport	587
Dead at Scene	4
TOTAL	720

Table 5: Breakdown of pedestrian incident outcomes. Data collection shows an even distribution of both sexes involved in pedestrian crashes and in transports. When examined by gender there are nominal differences in gender as 17% of women refused transport while 18% of men refused transport.
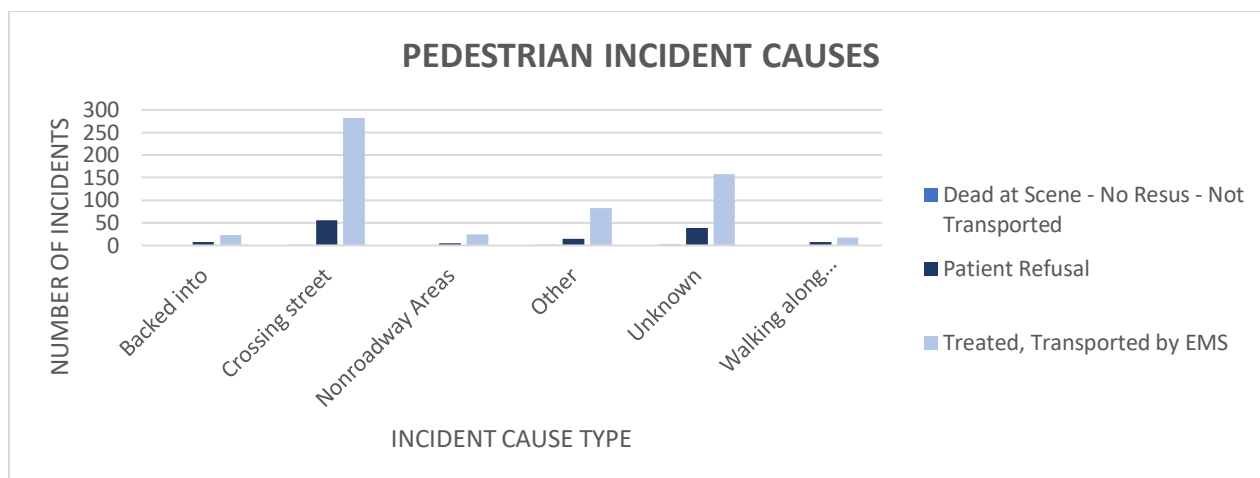
PEDESTRIAN INCIDENT CAUSES

Figure 14: Breakdown of incident outcomes by incident cause. Data shows 0.5% of all incidents resulted in a fatality. Only 17.7% of incidents resulted in a refusal, meaning the patient declined transport to the ED, while over 80% of pedestrian incidents resulted in transport to the ED. Of those transported, 48% were crossing the street at the time of the incident, indicating a high-risk area for pedestrians.
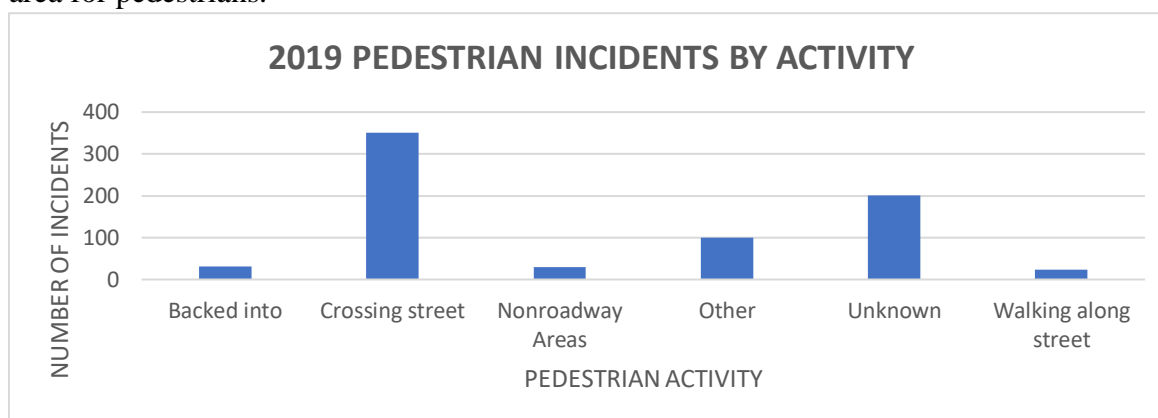

2019 PEDESTRIAN INCIDENTS BY ACTIVITY

Figure 15: Pedestrian activity during time of incident during 2019. When analyzed by month there was nominal differences, with only a noteworthy spike for pedestrians crossing the street in October and a decrease in April. Previous years show a consistent spike in October, which may be attributed to shortening daylight hours or changes in the weather making it more difficult for drivers to see.

There were 343 pedestrian incidents that occurred while the pedestrian was crossing the street when they either collided with a motor vehicle, bicyclist, or other transportation vehicle. There were 200 incidents involving an unknown cause or pedestrian activity when the incident took place. There were 99 incidents that were associated with an "other" cause, meaning the incident cause was listed but did not fall into other established categories.

There were 31 incidents caused by a vehicle backing into a pedestrian and 29 incidents where the pedestrian was in a non-roadway area such as a parking lot. There were 24 incidents that took place while the pedestrian was walking along the street, typically on a sidewalk when the incident occurred.

Of all pedestrian incidents, 92% involved a motor vehicle, 3.2% a bicyclist, and 2.2% by a public transit vehicle (i.e. bus or train). The most common pedestrian activity at time of incident was crossing the street, representing 48% of all pedestrian transports. This suggests further study into crosswalks and other designated pedestrian areas to reduce future incidents.
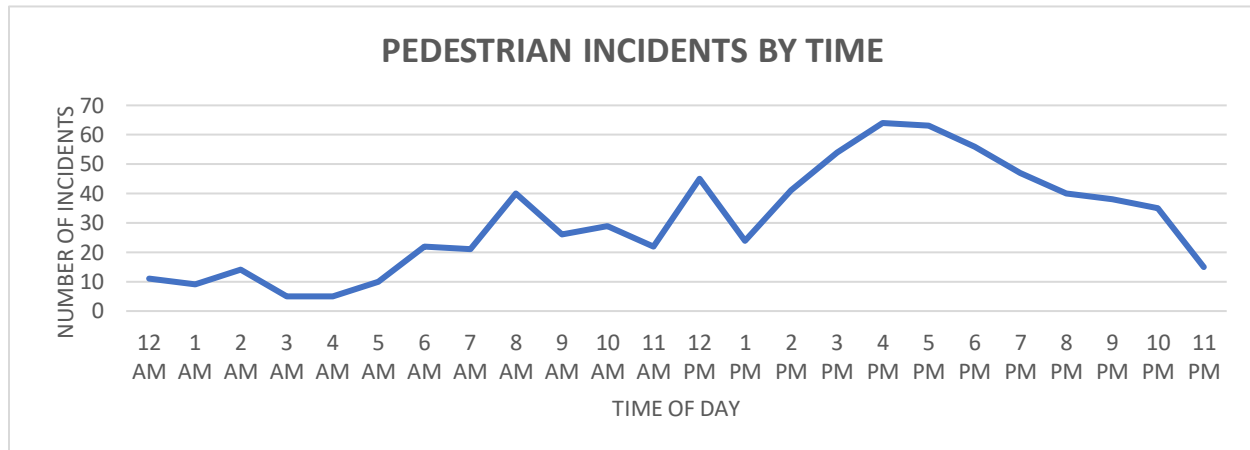

Figure 16: Pedestrian incidents graphed by time of day during 2019. Data is consistent with previous trends of a higher incidence of cases taking place during "rush hour" times in the morning, lunch time, and evening.

PEDESTRIAN INCIDENTS BY NEIGHBORHOOD

Data is broken down by neighborhood and incident type to provide further insight into the makeup of the Boston neighborhood and its associated factors in resulting pedestrian incidents.

Incident Type	Highest Cases	Second Highest Cases	Third Highest Cases
Crossing St	Boston (13%)	Dorchester (12.3%)	Roxbury (8.1%)
Walking along St	Boston (1.9%)	Dorchester (0.7%)	Roxbury (0.7%)
Backed into	Dorchester (1.2%)	Roxbury (1%)	South Boston (0.6%)
Non-Roadway Area	Dorchester (1.2%)	East Boston	Boston (1.1%)
Unknown	Boston (6.2%)	Dorchester (5.9%)	Roxbury (5.9%)
Other	Dorchester (3.2%)	Boston (3%)	Roxbury (2.9%)

Table 6: Depicts pedestrian incidents by incident type, calculated percentages represent the percentage of the total incidents for that particular incident. Boston proper has the highest incidence of incidents occurring while crossing the street (13% of all incidents), followed by Dorchester (12.3%), and Roxbury (8.1%). Boston proper accounts for 6.2% of all unknown bicyclist incidents, followed by Dorchester (5.9%), and Roxbury (5.9%).

Neighborhood	**Bicyclist Incidents**	**Pedestrian Incidents**
Boston	117	174
Brighton	42	38
Charlestown	15	7

Dorchester	63	178
East Boston	12	41
Hyde Park	4	16
Jamaica Plain	24	38
Mattapan	4	34
Roslindale	9	13
Roxbury	60	138
South Boston	20	47
West Roxbury	5	7

Table 7: Details the number of bicycle and pedestrian incidents during 2019 by Boston neighborhood.